Missouri Department of Natural Resources

Total Maximum Daily Load Information Sheet

Manacle and Cedar Creeks

Waterbody Segment at a Glance:

Counties: Callaway, Boone
Nearby Cities: Columbia, Fulton
Length of impairment:
Manacle: 2 miles
Cedar: 1 mile
Pollutants:
Manacle: pH and Sulfate
Cedar: Sulfate
Source: Manacle Creek Abandoned Mine Lands


State map showing location of watershed

TMDL Priority Ranking: TMDL Approved 2004

Description of the Problem

Beneficial uses of Manacle and Cedar Creeks

- Livestock and Wildlife Watering
- Protection of Warm Water Aquatic Life
- Protection of Human Health associated with Fish Consumption

Use that is impaired

- Protection of Warm Water Aquatic Life

Standards that apply

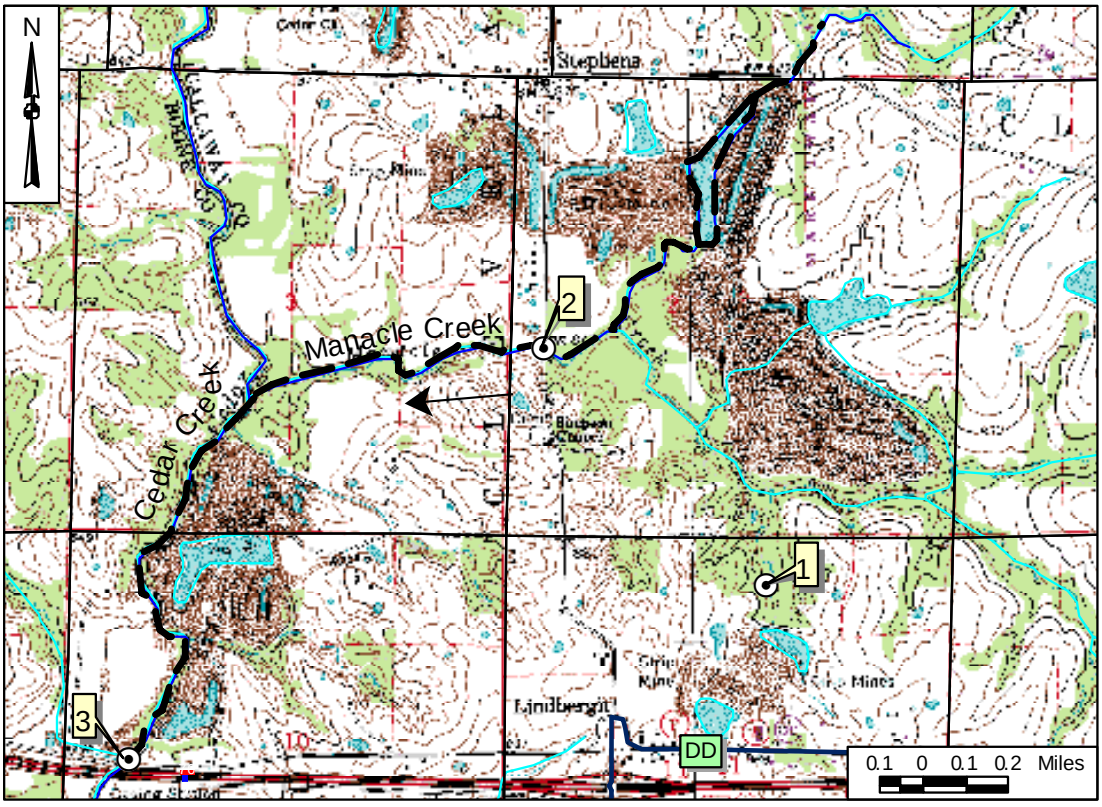
- Missouri's Water Quality Standards (WQS), 10 CSR20-7.031 Section (4)(E), state that water contaminants shall not cause pH to be outside of the range of 6.5-9.0 SU (Standard Units).
- Sulfate and chloride are linked together in the WQS. Section (4)(L)1 states that the concentration of chloride plus sulfate in streams with a 7Q10 low flow less than one cubic foot per second shall not exceed 1000 milligrams per liter (mg/L) for protection of aquatic life.

Background information and Water Quality Data

Manacle Creek is a tributary to Cedar Creek, which runs along the boundary between Boone and Callaway Counties. The area around these streams (and even right through them) was mined for coal, and the coal wastes contaminated the water. Sulfide minerals, common in coal and the surrounding rock, oxidize in the presence of water and oxygen to form highly acidic (low pH), iron- and sulfate-rich drainage. Both low pH and high levels of sulfate are harmful to aquatic life. Two reclamation

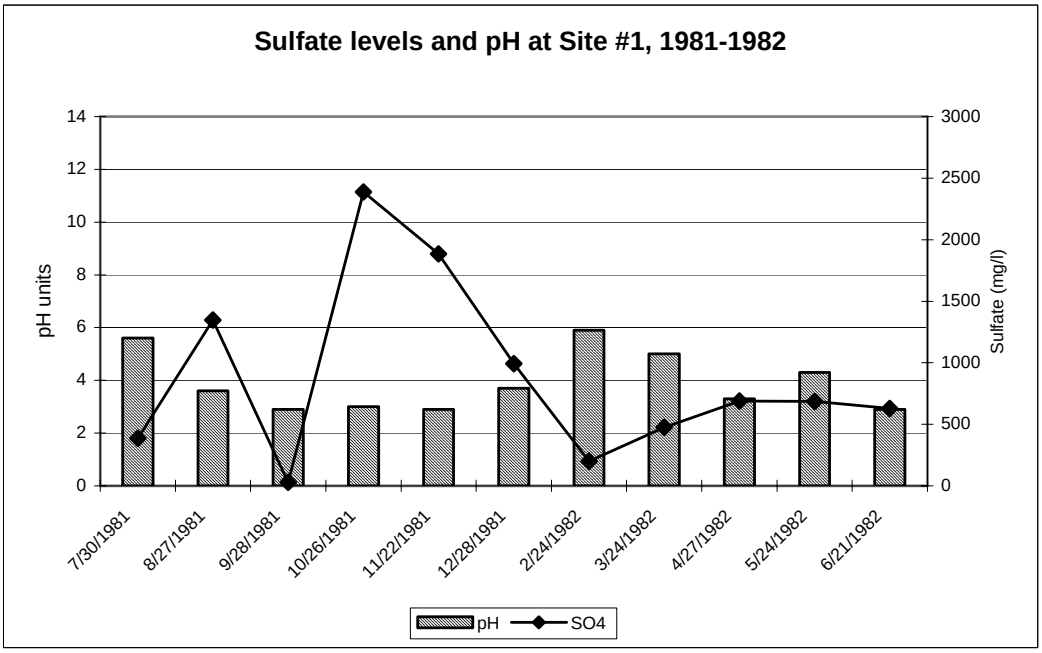
projects were completed for these creeks, one in 1985 and one in 1988, for a total of more than $2.4 million. These projects were accomplished mainly by re-contouring the surface of the land, eliminating acid ponds, burying acid-forming spoils and establishing permanent vegetation. In areas of concentrated coal wastes, a six-inch layer of lime was applied (under 18 inches of impermeable clay) prior to the placement of topsoil to help neutralize the acid-forming materials underneath. And these projects remedied the majority of the problems, maybe as much as 95 percent. Fixing the other five percent or so, however, will be more difficult and costly because of acidity forming underground and seeping directly into the stream. This will not be attempted until better technology is developed and more funds become available. The TMDL for the creeks was developed in 2004. Data collected in 2000 through 2003 show a marked improvement over pre-reclamation pH and sulfate levels. Future monitoring will show if those levels decline or not. The U.S. Environmental Protection Agency approved the TMDL July 14, 2004. A map of the area and graphs summarizing existing data can be found below.

Manacle and Cedar Creeks, Callaway and Boone Counties, Missouri
Sampling Sites and Mined Areas

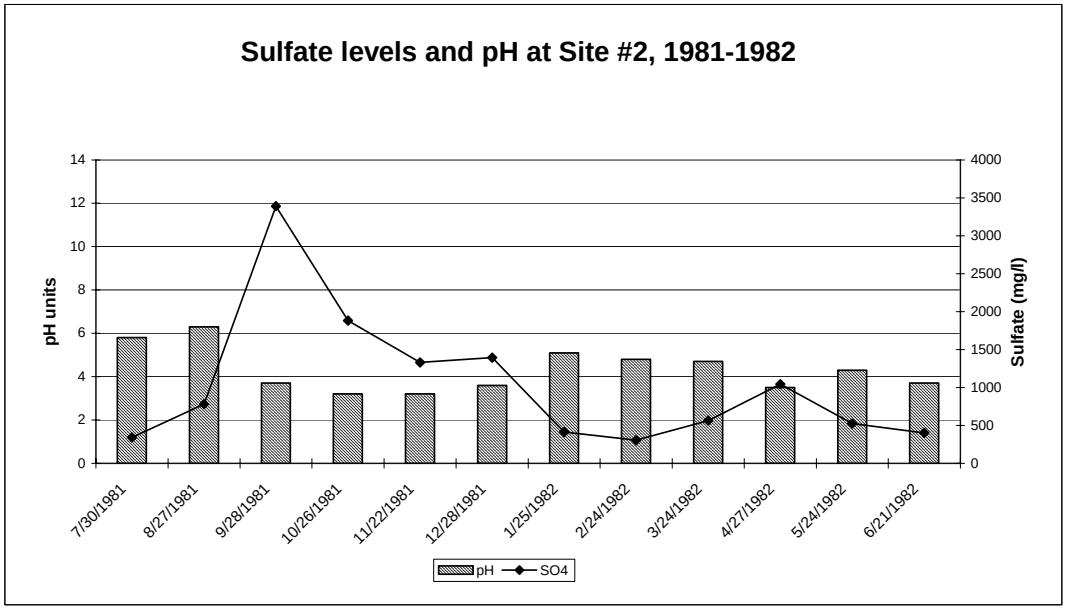


Impaired Segment ← Direction of Flow

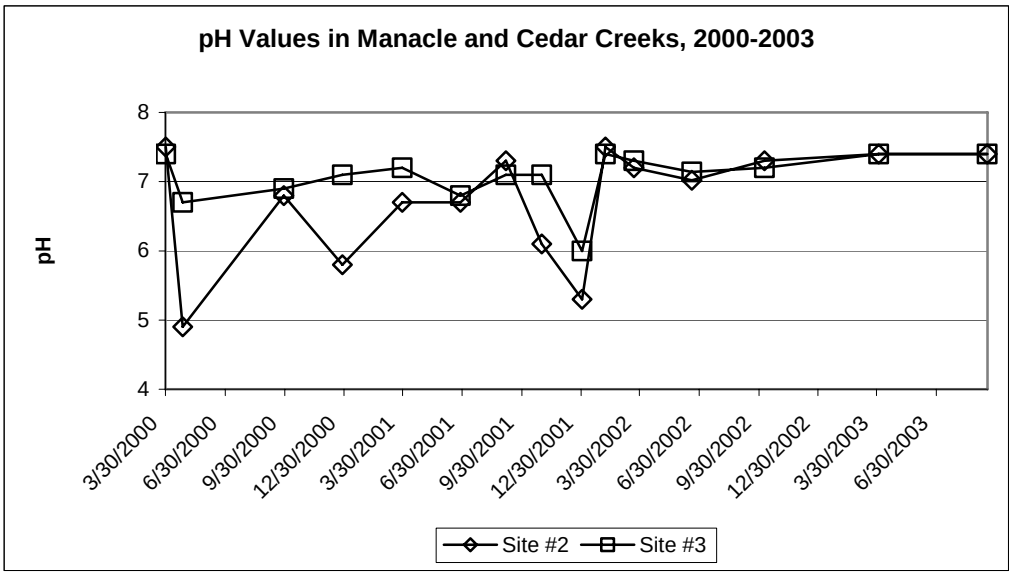
Site Index
1 – Tributary from reclaimed slurry pond
2 – Manacle Creek 0.5 mile south of Stephens
3 – Cedar Creek at Interstate 70



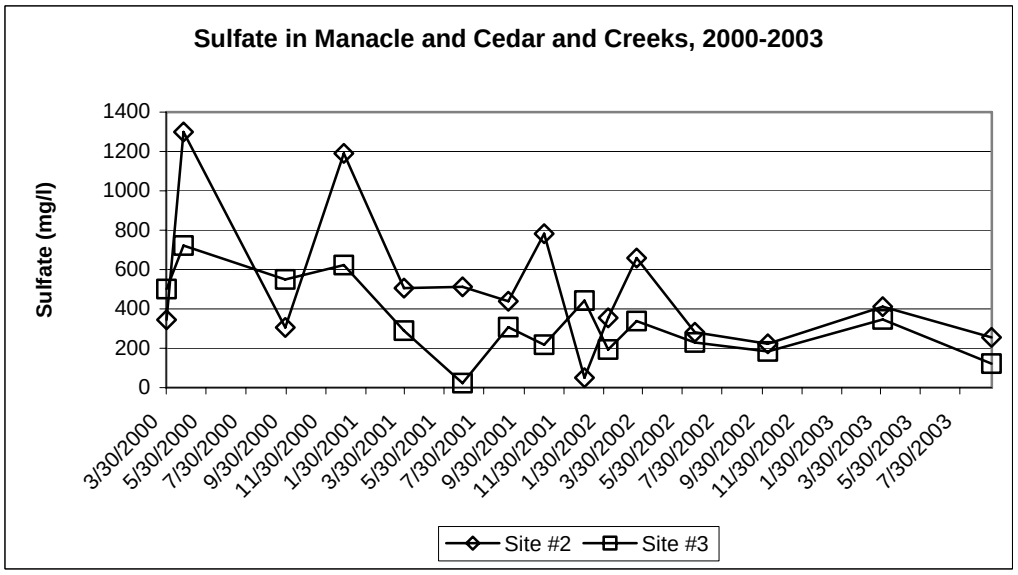
Source: Envirodine Engineers



Source: Envirodine Engineers



Source: Missouri Department of Natural Resources



Source: Missouri Department of Natural Resources

For more information call or write:

Missouri Department of Natural Resources
Water Protection Program
P.O. Box 176, Jefferson City, MO 65102-0176
1-800-361-4827 or (573) 751-1300 office
(573) 522-9920 fax
Program Home Page: www.dnr.mo.gov/env/wpp/index.html